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(p. 15, 16). Yet, even Maxwell speaks of 'heat rays,' almost as if they objectively possessed heat, and, of course, with the implication that 'rays of light' are not 'heat rays.' Can it be urged too strongly that the rays differ objectively only in wave-length and amplitude, and that their relations to heat and light are entirely and absolutely subjective? Yet loose phrasing is continually met with. Langley writes of 'luminous heat' and of 'the radically different character of the heat in these two maxima' (A. J. S., *ut supra*, 434, 435). Hallock writes: "Then it was that heat was recognized as another manifestation of those periodic disturbances, or waves, in that elastic medium which was then known as the luminiferous ether, and which is now universally known as 'the ether' (SCIENCE, *ut supra*, 174). Perhaps this refers to the mis-recognition of the early part of this century; perhaps professional physicists get along comfortably enough with 'dark heat rays' and the rest; but to those who have to use physical results in other lines of study, this indefinite phraseology is very troublesome.

W. M. DAVIS.

HARVARD UNIVERSITY, Sept. 30, 1895.

SHELLS AS IMPLEMENTS.

PLEASE call the attention of those who own or have charge of archæological cabinets to an illustration in von den Steinen's 'Unter den Naturvölkern Zentral Brasiliens,' 1894, p. 207, fig. 27. A fresh water mussel shell has a hole through it just as you see in specimens on plate xxvi. of Holmes' paper 'Art in Shell.' But von den Steinen says that these shells are used as scrapers; the edge on large objects and the hole through the shell is also used by the tribes living on the upper Shingu for smoothing or scraping wood. His next remark about pushing the hole in with an Akuri nut I do not comprehend.

O. T. MASON.

THE INVERTED IMAGE ON THE RETINA.

IN the last number of this journal (p. 438) Professor Brooks writes: "We all believe many things which are inconceivable, such as the truth that the image in our eyes is upside down." But why is this inconceivable? To

those having knowledge of elementary physics it is inconceivable that the image should not be inverted. Perhaps Professor Brooks means that it is incomprehensible that we should see things right side up when the image is upside down. This is sometimes urged, but would seem to be sufficiently answered by a remark once made by Lotze in the presence of the writer: "If any one is troubled by the fact that the image is inverted, let him suppose that the soul stands on its head." It is, indeed, quite as reasonable to suppose that the mind stands on its head as to suppose that it stands on its feet and looks at the image on the retina—which would seem to be the assumption of those who are troubled by the phenomenon.

A similar paradox is the fact that with two images on the retinas we see things singly. This may also be treated without undue seriousness by the question: "If we hear a baby crying with two ears, why do we not think it is twins?"

J. McK. C.

SCIENTIFIC LITERATURE.

Mental and Physical Fatigue by M. Mosso. Translation by P. Langlois. (Bibliothèque de philosophie contemporaine.) Paris, Félix Alcan. 1894.

The Difference Between the Muscles in Their Normal and Their Abnormal, or Fatigued Condition by M. WEDENSKY. Archives de physiologie; Comptes rendus de l'Académie des Sciences.

It is but recently that problems of this nature have been treated by physiologists.

Kronecker, in his experiments on the detached muscles of the frog, succeeded in obtaining 1,000, even 1,500 contractions, the intensity of which decreased regularly in proportion to the increase of fatigue; thus, for contractions at regular intervals, produced by currents of equal intensity, the curve of fatigue is a straight line. Kronecker also observed the great individual differences existing in animals in their power of resistance to fatigue.

M. Mosso, the author of the present work (unfortunately abridged in the French translation), is an Italian physiologist who has undertaken with an instrument of his own invention,